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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/972,606	10/05/2001	Jefferson YS Yang	LELI 3442	4594

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ROSENBERG, KLEIN & LEE
3458 ELLICOTT CENTER DRIVE-SUITE 101
ELLICOTT CITY, MD 21043

EXAMINER

ALEJANDRO, RAYMOND

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 06/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/972,606

Applicant(s)

YANG, JEFFERSON YS

Examiner

Raymond Alejandro

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01/16/04 & 03/17/04.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) 11-15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

This submission is responsive to the amendments filed 01/16/04 and 03/17/04. The applicant has overcome the double patenting rejection as well as the 35 USC 103 rejection. With respect to the double patenting rejection, applicant has submitted a terminal disclaimer to obviate said rejection. Refer to the abovementioned amendment for specific details on applicant's rebuttal arguments. In addition, the indicated allowability of certain claims is withdrawn in view of the newly discovered references. Rejections based on the newly cited references follow. Thus, the claims are non-finally rejected again.

Election/Restrictions

1. This application contains claims 11-15 drawn to an invention nonelected with traverse in the reply filed on 09/26/03 (paper # 9). A complete reply to the rejection must include cancelation of nonelected claims or other appropriate action.

Claim Objections

2. Claim 5 recites the limitation "the piston" in line 14 (or line 1 on bridging page 4 of 11). There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

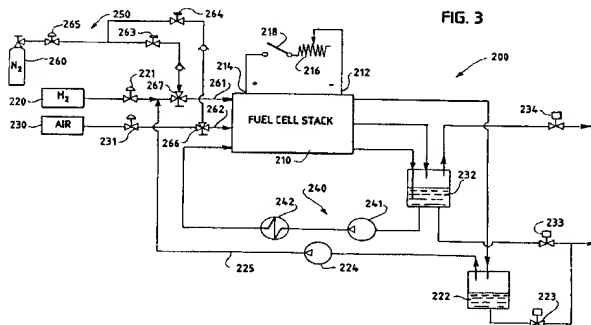
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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-2 and 4-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fletcher et al 5798186 in view of Henkel et al 4966528.

As to claim 1:

Fletcher et al disclose a fuel cell power generation system (TITLE/ABSTRACT) comprising a hydrogen supply 220 connected to the stack 210 and the pressure being controlled by pressure regulator 221. Unreacted hydrogen is recirculated to stack 210 by a pump 224 in recirculation loop 225 (COL 7, lines 30-40). It is disclosed that a purge system 250 is used to purge hydrogen in fuel cell stack 210. Flow of gas from a purge gas supply 260 to the hydrogen and conduits 261 is controlled by valves 263 and three-way valves 267 (COL 7, lines 45-52). Thus, the system has a fuel cell including respective inlet and outlet; and a recirculation system comprising an anode gas supply, a switch connected with the anode gas supply, a pressure regulating device connected between the switch and the anode gas input of the fuel cell, and a pump.



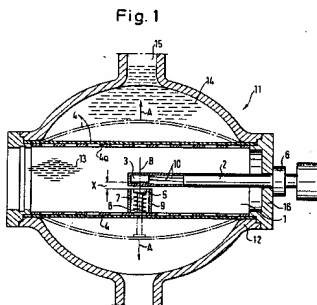
As to claim 2:

Fletcher et al disclose the hydrogen (COL 7, lines 30-35).

Fletcher et al disclose a fuel cell system including an anode recirculation system according to the foregoing. Nevertheless, Fletcher et al do not disclose the specific the diaphragm pump and its associated features.

As to claims 1 and 4:

Henkel et al disclose an apparatus for controlling the hydraulic circuit of a piston diaphragm pump (TITLE/ ABSTRACT) having at least a pump diaphragm alternately subjected to the pressure or the suction stroke of a piston operatingly connected to driving means, the apparatus comprising control means changing the amount of hydraulic medium displaced by the piston in dependence of a power demand or the like (ABSTRACT). **Figure 1** below illustrates the housing of the diaphragm pump including a displacement sensor (COL 2, lines 62-65). *Thus, the pump has a defined walls and divided internal spaces as well.*



Regarding claim 5:

Henkel et al disclose that the pump comprises variable electrical sensors such as Hall generator while the initiator is a magnet (COL 2, lines 55-60/CLAIM 5); it is particularly

disclose the use of a pair of sensors 35a, 35b which are Hall generators (COL 3, lines 65-68/ CLAIM 5).

Concerning claims 6-7:

Henkel et al further reveals that the apparatus uses a displacement sensor associated with the side of the diaphragm facing the hydraulic medium, wherein the sensor measures the stroke travel of the diaphragm and generating a stroke travel signal in accordance with the stroke travel (COL 1, lines 50-60). It is also disclosed that in their embodiment, a twofold effective piston diaphragm pump having two housings being the inner chamber 23a, 23b of the diaphragm 22a, 22b each connected to the piston chamber 24a, 24b wherein the piston 26 is oscillatingly driven by driving means (COL 3, lines 40-55). *Thus, the piston is adapted to move from a first position to a second position.* It is also disclosed that the displacement sensors 35a, 35b detect the stroke movement of the diaphragm wherein an analogue signal transmitted to the control unit (COL 4, lines 18-30). *It is noted that any feature associated with the piston itself can act as the required elastic device.*

With reference to claim 8:

It is also disclosed that the pump system expel air from the hydraulic circuit (CLAIM 1). *Hence, it is communicated with the immediate atmosphere.*

In view of the above, it would have been obvious to one skilled in the art at the time the invention (the invention as a whole) was made to use the specific the diaphragm pump and its associated features of Henkel et al in the fuel cell anode recirculation system Fletcher et al because Henkel et al disclose that the disclosed diaphragm pump comprises control means changing the amount of hydraulic medium displaced by the piston in dependence of a power

demand or the like. Thus, the diaphragm pump is equipped itself with a control system capable of being responsive to signals generated in a hydraulic circuit. In addition, Henkel et al's invention provides an apparatus for controlling the hydraulic circuit of a piston diaphragm pump by which the hydraulic power of the pump can be controlled under consideration of the diaphragm stroke and/or the diaphragm stroke can be monitored with respect to a maximum expansion. *Moreover, both references are found to be pertinent and relevant to one another as they mutually address the same problem of providing suitable flow of fluid in a hydraulic circuits.*

5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fletcher et al 5798186 in view of Henkel et al 4966528 as applied to claim 1 above, and further in view of Tanaka et al 6536551.

Fletcher et al'186 and Henkel et al'528 are applied, argued and incorporated herein for the reasons above. However, the foregoing references do not disclose the electromagnetic valve.

Tanaka et al disclose a hydrogen using system comprising first and second electromagnetic valves (ABSTRACT).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to use electromagnetic valve of Tanaka et al in the anode stream recirculation system of Fletcher et al'186 and Henkel et al'528 because Tanaka et al disclose the electromagnetic valve can be provided in the anode gas supply line to electromagnetically control portions of the hydrogen using systems. That is, when hydrogen control is required, the

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electromagnetic valves can be operated (closed or open) based on detection signals from a sensor, thereby, further flow control and improved safety of the system is obtained.

6. Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fletcher et al 5798186 in view of Henkel et al 4966528 as applied to claims 1 and 4 above, and further in view of Edlund et al 2002/0119353.

Fletcher et al'186 and Henkel et al'528 are applied, argued and incorporated herein for the reasons above. Nonetheless, the preceding prior art does not expressly disclose the specific check valves and water inlet/outlet of the diaphragm pump.

With respect to claim 9:

Edlund et al discloses a fuel cell system comprising a fuel cell, a fuel processor that produces hydrogen (ABSTRACT) and a dual-head pump 350 including a diaphragm pump or a piston pump (SECTION 0041/FIGURE 7).

Edlund et al also teach the use of valves 62 and 42, and a pressure regulator 40 wherein the valves and the pressure regulator are connected with the anode gas supply (SECTION 0027 and 0024). **Figure 7** below illustrates these features.

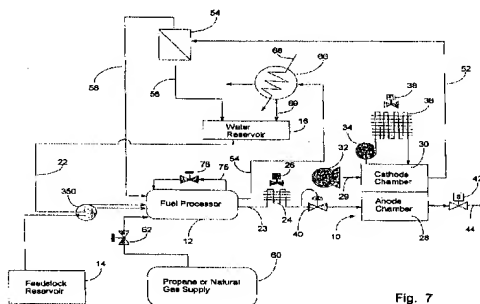


Fig. 7

Edlund et al teach the use of valves 62 and 42, and a pressure regulator 40 wherein the valves and the pressure regulator are connected with the anode gas supply (SECTION 0027 and 0024). As illustrated in **Figure 7** above, in particular, valve 62 is provided upstream of the anode gas input, valve 42 is provided downstream of the anode gas output, and pressure regulator 40 is also provided upstream of the anode gas input.

With respect to claim 10:

Edlund et al teach the dual-head pump 350 supplies both feedstock from reservoir 14 and feed water from reservoir 16 (SECTION 0041). *Thus, the dual-head pump of Edlund et al comprises respective water inlet and outlet and an interior space filled with water and in communication with a water circulation system* (SEE FIGURE 7).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to use the specific check valves of Edlund et al in the anode stream recirculation system of Fletcher et al'186 and Henkel et al'528 because Edlund et al teach that the specified switch and valves ensure the pressure of the hydrogen supplied to the anode chamber of the fuel cell remains at an acceptable value. Thus, it provides a periodic adjustment of the supplied hydrogen in the anode gas supply by regulating the flow of hydrogen or fuel being fed to the fuel cell system.

As far as the water inlet/outlet of the diaphragm pump, it would have been obvious to one skilled in the art at the time the invention was made to use the diaphragm pump having the water inlet/outlet of Edlund et al in the anode stream recirculation system of Fletcher et al'186 and Henkel et al'528 because Edlund et al disclose that diaphragm pumps are dual-head pump which are able to supply both the anode gas and water so as to maintain a satisfactory pumping rate

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which is essentially constant over the entire range of delivery rates. This is achievable because the displacement volume ratio of the dual-head pump is fixed by the displacement volumes of each of the two pump heads and both pump heads are driven at the same speed by the same drive motor. Thus, the diaphragm pump provides a constant volume rate of delivered fluid.

Allowable Subject Matter

7. The indicated allowability of claims 5-7 is withdrawn in view of the newly discovered reference(s) as seen above. Rejections based on the newly cited reference(s) has been set forth in the immediately preceding paragraphs.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Raymond Alejandro
Examiner
Art Unit 1745

A handwritten signature in black ink, appearing to read 'Ray', with a long horizontal stroke extending to the right.